

TABLE 9-1

Method Detection Limit (MDL) study testing 7 replicate soils for Gasoline Range Organic Hydrocarbons, measuring samples containing low concentrations of fresh, non-weathered gasoline.

Soil spiked with 20 ppm Gasoline ¹	UVF-3100 - GRO 5-Point Calibration Curve ² Results in ppm (mg/Kg):	UVF-3100 - GRO 1-Point Calibration Curve ³ Results in ppm (mg/Kg):
<u>Sample ID:</u>		
GRO - 1	2.50	3.08
GRO - 2	2.42	3.02
GRO - 3	2.20	2.72
GRO - 4	2.00	2.54
GRO - 5	1.86	2.36
GRO - 6	1.66	2.14
GRO - 7	1.30	1.72
Standard Deviation:	0.43	0.49
Std Dev x 3.143:	MDL = 1.34 ppm	MDL = 1.53 ppm

¹Soil sample was prepared by spiking 0.5 mL of a 2,000 ppm standard containing premium unleaded gasoline (93-octane, Hess, Haverhill, MA) and adding it to 50 grams of certified, clean sea sand. The sample was homogenized thoroughly and kept cool for 1 hour prior to use. The soil jar was then opened and 7 sub-samples were prepared by weighing out 5 grams of soil each and adding 10 mL of methanol for extraction. The linear drop in GRO concentrations exhibited is due to volatilization that occurred during the time it took to measure out the seven 5 gram, sub-samples (approx. 5 minutes).

²Sitelab's UVF-3100D analyzer (Serial No. 31-1053) was calibrated to a linear 5-point calibration curve using Sitelab GRO calibration kit, Product No. CAL-025, measured on the analyzer's Slot B optical filters.

³A second analyzer was used to measure the same samples for comparison (Serial No. 7-1831). Instrument was calibrated to a 1-point calibration curve using the same GRO calibration kit. For maximum performance, manufacturer recommends using a 5-point calibration curve. To save time during the calibration process, however, the analyzer can be calibrated to 1-point (plus the blank), which yields test results slightly higher when compared using the multi-point calibration feature.

TABLE 9-2

Method Detection Limit (MDL) study testing 7 replicate soils for Extended Diesel Range Organic Hydrocarbons, measuring samples containing low concentrations of home heating oil (No. 2 fuel oil).

Soil spiked with 5 ppm Home Heating Oil ¹	UVF-3100 - DRO 5-Point Calibration Curve ² Results in ppm (mg/Kg):	UVF-3100 - DRO 1-Point Calibration Curve ³ Results in ppm (mg/Kg):
<u>Sample ID:</u>		
DRO - 1	4.184	4.266
DRO - 2	4.192	4.256
DRO - 3	4.188	4.270
DRO - 4	4.160	4.244
DRO - 5	4.134	4.216
DRO - 6	4.202	4.280
DRO - 7	4.176	4.256
Standard Deviation:	0.02	0.02
Std Dev x 3.143:	MDL = 0.07 ppm	MDL = 0.07 ppm

¹Soil sample was prepared by spiking 0.5 mL of a 500 ppm standard containing home heating oil (Garden City Oil, Newton, MA) and adding it to 50 grams of certified, clean sea sand. The sample was homogenized thoroughly and kept cool for 1 hour prior to use. The soil jar was then opened and 7 sub-samples were prepared by weighing out 5 grams of soil each and adding 10 mL of methanol for extraction.

²Sitelab's UVF-3100D analyzer (Serial No. 31-1053) was calibrated to a linear 5-point calibration curve using Sitelab EDRO Calibration kit, Product No. CAL-042, measured on the analyzer's Slot A optical filters.

³A second analyzer was used to measure the same samples for comparison (Serial No. 7-1831). Instrument was calibrated to a 1-point calibration curve using the same EDRO calibration kit. For maximum performance, manufacturer recommends using a 5-point calibration curve. To save time during the calibration process, however, the analyzer can be calibrated to 1-point (plus the blank), which yields test similar results when compared using the multi-point calibration feature.

TABLE 9-3

Method Detection Limit (MDL) study testing 7 replicate soils for Extractable Petroleum Hydrocarbons, EPH C11-C22 Aromatic Hydrocarbons (or Total PAHs), measuring samples containing low concentrations of home heating oil (No. 2 fuel oil).

Soil spiked with 5 ppm Home Heating Oil ¹	UVF-3100 - EPH 5-Point Calibration Curve ² Results in ppm (mg/Kg):	UVF-3100 - EPH 1-Point Calibration Curve ³ Results in ppm (mg/Kg):
<u>Sample ID:</u>		
EPH - 1	1.07	1.08
EPH - 2	1.08	1.06
EPH - 3	1.07	1.07
EPH - 4	1.07	1.06
EPH - 5	1.06	1.04
EPH - 6	1.09	1.08
EPH - 7	1.07	1.06
Standard Deviation:	0.01	0.01
Std Dev x 3.143:	MDL = 0.03 ppm	MDL = 0.04 ppm

¹The same seven soil extracts used for EDRO analysis were re-tested and tested for this EPH MDL study. See Table 9-2 for details.

²Sitelab's UVF-3100D analyzer (Serial No. 31-1053) was calibrated to a linear 5-point calibration curve using Sitelab PAH Calibration kit, Product No. CAL-060, measured on the analyzer's Slot A optical filters.

³A second analyzer was used to measure the same samples for comparison (Serial No. 7-1831). Instrument was calibrated to a 1-point calibration curve using the same PAH calibration kit. For maximum performance, manufacturer recommends using a 5-point calibration curve. To save time during the calibration process, however, the analyzer can be calibrated to 1-point (plus the blank), which yields test results similar when compared using the multi-point calibration feature.

TABLE 9-4

Sitelab Method Detection Limit (MDL) study testing 7 replicate soils for Polycyclic Aromatic Hydrocarbons (Target PAHs), measuring samples containing low concentrations of coal tar from a former Manufactured Gas Plant using the UVF-3100 and TD-500 analyzers.

Soil spiked with 5 ppm MGP Coal Tar ¹	UVF-3100 - Target PAHs 5-Point Calibration Curve ² Results in ppm (mg/Kg):	UVF-3100 - Target PAHs 1-Point Calibration Curve ³ Results in ppm (mg/Kg):	TD-500 - PAHs ⁴ uses similar PAH Cal Kit Results in ppm (mg/Kg)
<u>Sample ID:</u>			
PAH - 1	0.464	0.564	0.270
PAH - 2	0.472	0.566	0.282
PAH - 3	0.464	0.558	0.282
PAH - 4	0.466	0.554	0.280
PAH - 5	0.476	0.580	0.292
PAH - 6	0.474	0.572	0.292
PAH - 7	0.492	0.588	0.298
Standard Deviation:	0.01	0.01	0.01
Std Dev x 3.143:	MDL = 0.03 ppm	MDL = 0.04 ppm	MDL = 0.03 ppm

¹Soil sample was prepared by spiking 0.5 mL of a 500 ppm standard containing coal tar from a former MGP site contaminated by DNAPL (Raleigh, NC) and adding it to 50 grams of certified, clean sea sand. The sample was homogenized thoroughly and kept cool for 1 hour prior to use. The soil jar was then opened and 7 sub-samples were prepared by weighing out 5 grams of soil each and adding 10 mL of methanol for extraction.

²Sitelab's UVF-3100D analyzer (Serial No. 31-1053) was calibrated to a linear 5-point calibration curve using Sitelab PAH Calibration kit, Product No. CAL-060, measured on the analyzer's Slot D optical filters.

³A second analyzer was used to measure the same samples for comparison (Serial No. 7-1831). Instrument was calibrated to a 1-point calibration curve using the same PAH calibration kit. For maximum performance, manufacturer recommends using a 5-point calibration curve. To save time during the calibration process, however, the analyzer can be calibrated to 1-point (plus the blank), which yields test results slightly higher when compared using the multi-point calibration feature.

⁴Sitelab TD-500 analyzer was also used in this MDL study (Serial No. 550302). The analyzer is more sensitive to the heavier PAH compounds (4 and 5 rings) when compared to the UVF-3100 model. The instrument was calibrated to Sitelab CAL-061.

TABLE 9-5

Method Detection Limit (MDL) study testing 7 replicate soils for Total Petroleum Hydrocarbons in Oil (TPH-Oil), measuring samples containing low concentrations of crude oil using the UVF-3100 and TD-500 analyzers.

Soil spiked with 5 ppm Crude Oil ¹	UVF-3100 - TPH Oil 5-Point Calibration Curve ² Results in ppm (mg/Kg):	UVF-3100 - TPH Oil 1-Point Calibration Curve ³ Results in ppm (mg/Kg):	TD-500 - TPH Oil ⁴ uses similar TPH Cal Kit Results in ppm (mg/Kg)
<u>Sample ID:</u>			
TPH - 1	7.90	8.62	14.8
TPH - 2	7.96	8.68	15.0
TPH - 3	7.90	8.62	14.8
TPH - 4	8.10	8.82	15.2
TPH - 5	8.00	8.70	14.8
TPH - 6	8.36	9.12	15.8
TPH - 7	8.20	8.94	15.4
Standard Deviation: Std Dev x 3.143:	0.17 MDL = 0.54 ppm	0.19 MDL = 0.59 ppm	0.38 MDL = 1.20 ppm

¹Soil sample was prepared by spiking 0.5 mL of a 500 ppm standard containing crude oil from a refinery (Chevron Texaco, Richmond, CA) and adding it to 50 grams of certified, clean sea sand. The sample was homogenized thoroughly and kept cool for 1 hour prior to use. The soil jar was then opened and 7 sub-samples were prepared by weighing out 5 grams of soil each and adding 10 mL of methanol for extraction.

²Sitelab's UVF-3100D analyzer (Serial No. 31-1053) was calibrated to a linear 5-point calibration curve using Sitelab TPH-Oil Calibration kit, Product No. CAL-057, measured on the analyzer's Slot A optical filters.

³A second analyzer was used to measure the same samples for comparison (Serial No. 7-1831). Instrument was calibrated to a 1-point calibration curve using the same PAH calibration kit. For maximum performance, manufacturer recommends using a 5-point calibration curve. To save time during the calibration process, however, the analyzer can be calibrated to 1-point (plus the blank), which yields test results slightly higher when compared using the multi-point calibration feature.

⁴Sitelab TD-500 analyzer was also used in this MDL study (Serial No. 550302). The analyzer is more sensitive to the heavier PAH compounds (4 and 5 rings) when compared to the UVF-3100 model. The instrument was calibrated to Sitelab TPH-Oil calibration kit, Product No. CAL-056.